

AMENDMENTS TO THE CLAIMS

Please amend claims 9, 17, 18, 21, 22, 24, 27, 30-34 and 36, and cancel claims 2, 12, and 29 and add claims 37 and 38, such that the status of the claims is as follows:

1. (Previously presented) A sensor for measuring a measurable parameter, the sensor comprising:
a source of electromagnetic energy; and
an electromagnetic resonator, disposed to receive at least a portion of the electromagnetic energy, the electromagnetic resonator having a dielectric body with a sensing surface responsive to changes in the measurable parameter at the sensing surface and the electromagnetic resonator defining a cavity forming a variable gap that varies in response to the sensing surface and that is positioned such that a resonant frequency associated with an electromagnetic standing wave in the dielectric body and the variable gap changes in response to changes in the measurable parameter;
wherein the resonator is internal to the source, forming a cavity of a mode-locked source.
2. (Canceled)
3. (Original) The sensor of claim 1, wherein the resonator comprises a resonant antenna.
4. (Original) The sensor of claim 1, wherein the resonator comprises a resonant transmission line.
5. (Original) The sensor of claim 1, wherein the measurable parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.
6. (Original) The sensor of claim 1, further comprising a measuring apparatus for measuring a repetition rate of the energy.
- 7-8. (Cancelled)

9. (Currently amended) A sensor for use in measuring a measurable parameter, the sensor comprising:

a source of suboptical electromagnetic energy; and

a resonator having a dielectric body with a variable cavity gap responsive to changes in the measurable parameter at a sensing surface, and having an electrically conductive layer on at least one interior wall of the dielectric body defining the variable cavity gap, the resonator defining a resonant frequency of a standing electromagnetic wave in the dielectric body and the variable cavity gap that is dependent upon the measurable parameter at the sensing surface, the resonator being disposed such that a signal from the sensor is a function of the resonant frequency;

wherein the dielectric body, the electrically conductive layer and the variable cavity gap are configured to resonate at suboptical frequencies as a function of the measurable parameter.

10. (Original) The sensor apparatus of claim 9 wherein the resonator is internal to the source and forms a cavity of the source.

11. (Original) The sensor apparatus of claim 9, wherein the resonator forms a resonator that is external to the source.

12. (Cancelled)

13. (Original) The sensor of claim 9, wherein the resonator comprises a resonant antenna.

14. (Original) The sensor of claim 9, wherein the resonator comprises a resonant transmission line.

15. (Original) The sensor of claim 9, wherein the measurable parameter is selected from the

group consisting of pressure, temperature, flow rate, material composition, force, and strain.

16. (Original) The sensor apparatus of claim 9, further comprising a measuring apparatus for measuring the frequency of the signal.

17. (Currently amended) An apparatus for modulating, based on a measurable parameter, the output of a source producing electromagnetic energy, the apparatus comprising:

a coupler coupled to receive the energy; and

a high Q resonator having a dielectric body with a variable cavity gap configured to produce an effective dielectric constant that varies in response to changes in the measurable parameter, the high Q resonator coupled to the coupler for receiving the energy and creating an electromagnetic standing wave within the dielectric body and the variable cavity gap at a resonant frequency that is a function of the measurable parameter; wherein the source has a resonator characterized by a first Q value Q1, and the high Q resonator is characterized by a second Q value Q2, that is substantially higher than Q1.

18. (Currently amended) The apparatus of claim 17 [[35]], wherein the measurable parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.

19. (Cancelled)

20. (Previously presented) The apparatus of claim 17, wherein Q2 is at least 100.

21. (Currently amended) A variable frequency resonator comprising an electromagnetic resonator having a dielectric body and a cavity defining a variable gap, and an electrically conductive layer on at least one interior wall of the dielectric body defining the cavity, the resonator producing an output

at a resonant frequency that is dependent upon the variable gap which is disposed to alter a ratio of stored electric field and magnetic field energy of an electromagnetic standing wave in response to changes in the measurable parameter; wherein the dielectric body, the electrically conductive layer and the cavity are configured to resonate at suboptical frequencies ~~frequency~~ as a function of the measurable parameter.

22. (Currently amended) A method of sensing a measurable parameter, the method comprising:

providing a resonator characterized by a resonant frequency that is a function of a variable gap in an internal cavity of a dielectric body of the resonator, the variable gap being responsive to the measurable parameter wherein the resonator includes an electrically conductive layer on at least one interior wall of the dielectric body defining the internal cavity;

supplying suboptical electromagnetic energy to the resonator to produce an electromagnetic standing wave in the dielectric body and the variable gap; and
sensing a suboptical resonant frequency of the electromagnetic standing wave to determine the measurable parameter.

23. (Previously presented) A method of sensing a measurable parameter, the method comprising the steps of:

providing a pulsed suboptical electromagnetic signal characterized by a repetition rate;
providing a resonator having a dielectric body with a variable gap that varies in response to changes in the measurable parameter;
supplying the pulsed suboptical electromagnetic signal to the resonator to produce a pulsed electromagnetic wave pattern in the dielectric body and the variable gap; and
sensing variations in the repetition rate of the pulsed suboptical electromagnetic signal in response to variations in the variable gap.

24. (Currently amended) A resonator having a dielectric body with a variable gap that varies in

response to changes in a measurable parameter, and having an electrically conductive layer on at least one interior wall of the dielectric body defining the variable gap, the resonator configured for receiving suboptical electromagnetic energy and producing an electromagnetic standing wave in the dielectric body and the variable gap so that a characteristic of the suboptical electromagnetic energy changes in response to variations in the variable gap, wherein the dielectric body, electrically conductive layer and the variable gap are configured to resonate at suboptical frequencies, as a function of the measureable parameter.

25. (Previously presented) The resonator of claim 24, wherein the suboptical electromagnetic energy is a continuous wave and the characteristic is frequency.

26. (Previously presented) The resonator of claim 24, wherein the suboptical electromagnetic energy is a pulsed energy and the characteristic is repetition rate.

27. (Currently amended) An electromagnetic resonant sensor comprising:

a dielectric sensor body; [[and]]

a cavity within the sensor body having a variable gap between interior surfaces of the sensor body that varies as a function of a measurable parameter, the cavity being positioned within the sensor body so that an electromagnetic standing wave is formed within the body and the variable gap, and a resonant frequency of the sensor is a function of the measurable parameter; and

an electrically conductive layer on at least one interior wall of the dielectric body defining the cavity; and

wherein the sensor body, the electrically conductive layer and cavity are configured to resonate at suboptical frequencies as a function of the measureable parameter.

28. (Cancelled)

29. (Cancelled)

30. (Currently amended) The electromagnetic resonant sensor of claim 27 [[29]] wherein the electrically conductive layer has a ring or circular shape ~~conductor is configured~~ to cause the sensor to resonate as a ring resonator.

31. (Currently amended) The electromagnetic resonant sensor of claim 27 [[29]] wherein the electrically conductive layer has an elongated shape ~~conductor is configured~~ to cause the sensor to resonate as a transmission line.

32. (Currently amended) The electromagnetic resonant sensor of claim 27 [[29]] wherein the electrically conductive layer includes one or more slots ~~conductor is configured~~ to cause the sensor to resonate as a slot antenna.

33. (Currently amended) The electromagnetic resonant sensor of claim 27 [[29]] wherein the electrically conductive layer is shaped ~~conductor is configured~~ to cause the sensor to resonate as a dipole antenna.

34. (Currently amended) The electromagnetic resonant sensor of claim 27 [[29]] wherein the electrically conductive layer includes at least one opening ~~conductor is configured~~ to cause the sensor to resonate as a port antenna.

35. (Cancelled)

36. (Currently amended) An electromagnetic resonant sensor for receiving suboptical electromagnetic energy and producing an output based upon an electromagnetic standing wave having a resonant frequency that is a function of a parameter to be measured, the sensor characterized by a dielectric body with a variable gap that changes dimension as a function of the

parameter, and an electrically conductive layer on at least one interior wall of the dielectric body defining the variable gap; the dielectric body, the electrically conductive layer and the variable gap being configured to resonate at suboptical frequencies as a function of the measureable parameter so that the electromagnetic standing wave extends within the dielectric body and the variable gap and a change in gap dimension causes a change in the resonant frequency.

37. (New) A sensor for use in measuring a measurable parameter, the sensor comprising:
a source of suboptical electromagnetic energy; and
a resonator having a dielectric body with a variable cavity gap responsive to changes
in the measurable parameter at a sensing surface, the resonator defining a
resonant frequency of a standing electromagnetic wave in the dielectric body
and the variable cavity gap that is dependent upon the measurable parameter
at the sensing surface, the resonator being disposed such that a signal from
the sensor is a function of the resonant frequency;
wherein the dielectric body and the variable cavity gap are configured to resonate at
suboptical frequencies as a function of the measurable parameter; and
wherein the resonator is internal to the source and forms a cavity of the source.
38. (New) A resonator having a dielectric body with a variable gap that varies in response to
changes in a measurable parameter, the resonator configured for receiving suboptical electromagnetic
energy and producing an electromagnetic standing wave in the dielectric body and the variable gap
so that a characteristic of the suboptical electromagnetic energy changes in response to variations in
the variable gap, wherein the dielectric body and the variable gap are configured to resonate at
suboptical frequencies, as a function of the measurable parameter, wherein the suboptical
electromagnetic energy is a pulsed energy and the characteristic is repetition rate.